The New Relative Forage Quality Index – Concept and Use

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Introduction

- Each year the World's Forage Superbowl Contest is conducted at the World's Dairy Expo in Madison, WI.
- In 2003, 160 alfalfa hay, baleage and silage samples were submitted from 24 states and 2 Canadian provinces.
- In addition to the standard fiber analysis (ADF and NDF), samples were analyzed for digestible fiber (NDFD).
- We calculated Relative Feed Value (RFV) and Relative Forage Quality (RFQ).

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Sampling of Empirical equations

- From Western Region
  - %TDN = 82.38 - (0.7515 x ADF)
- From Pennsylvania
  - %TDN = 4.898 + (89.796 x NEL)
  - NEL (Mcal/lb) = 1.044 - (0.0119 x ADF)
- From Midwest
  - %DDM = 88.9 - (0.779 x ADF)

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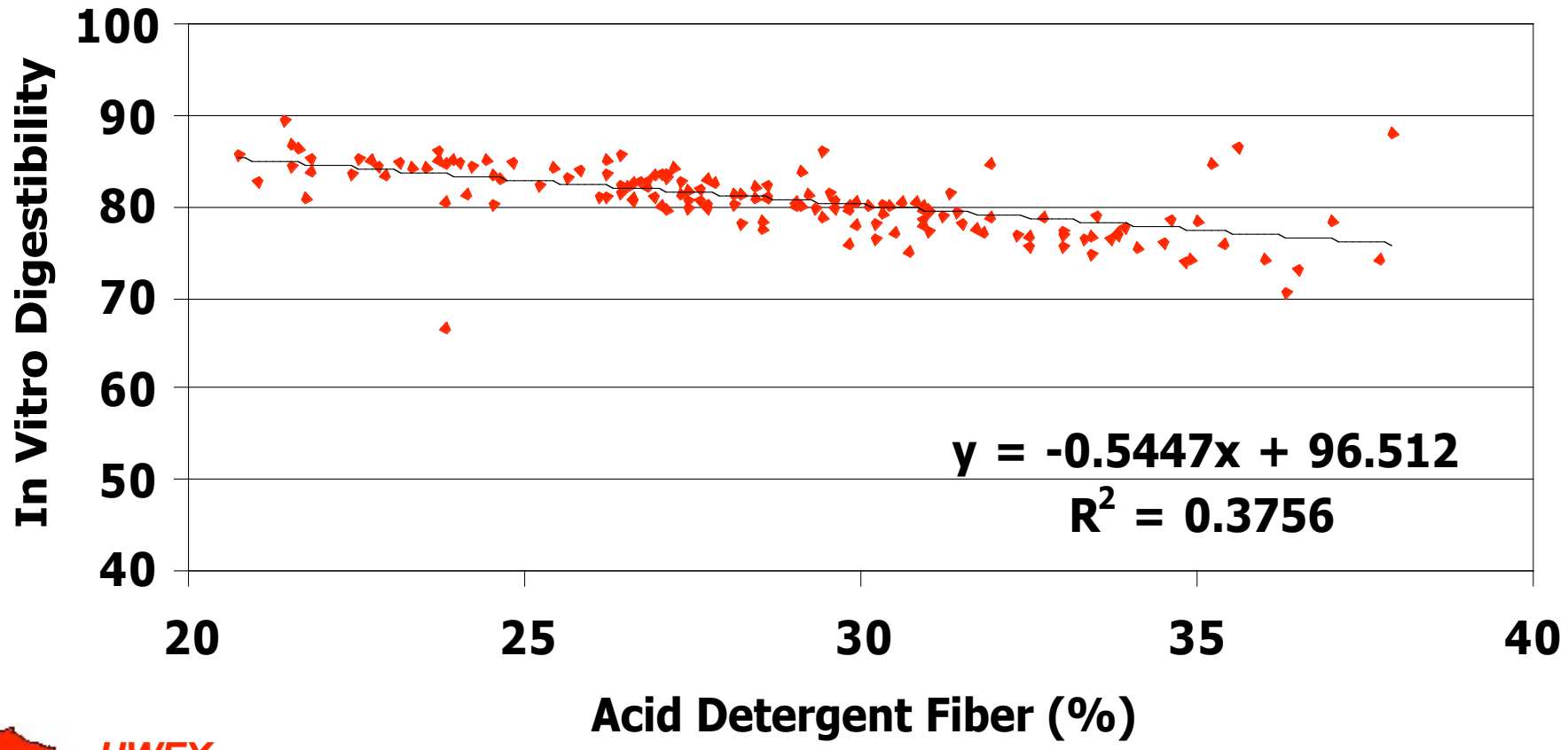
Comparison of ADF to in vitro digestibility of 2003 World Forage Superbowl Samples



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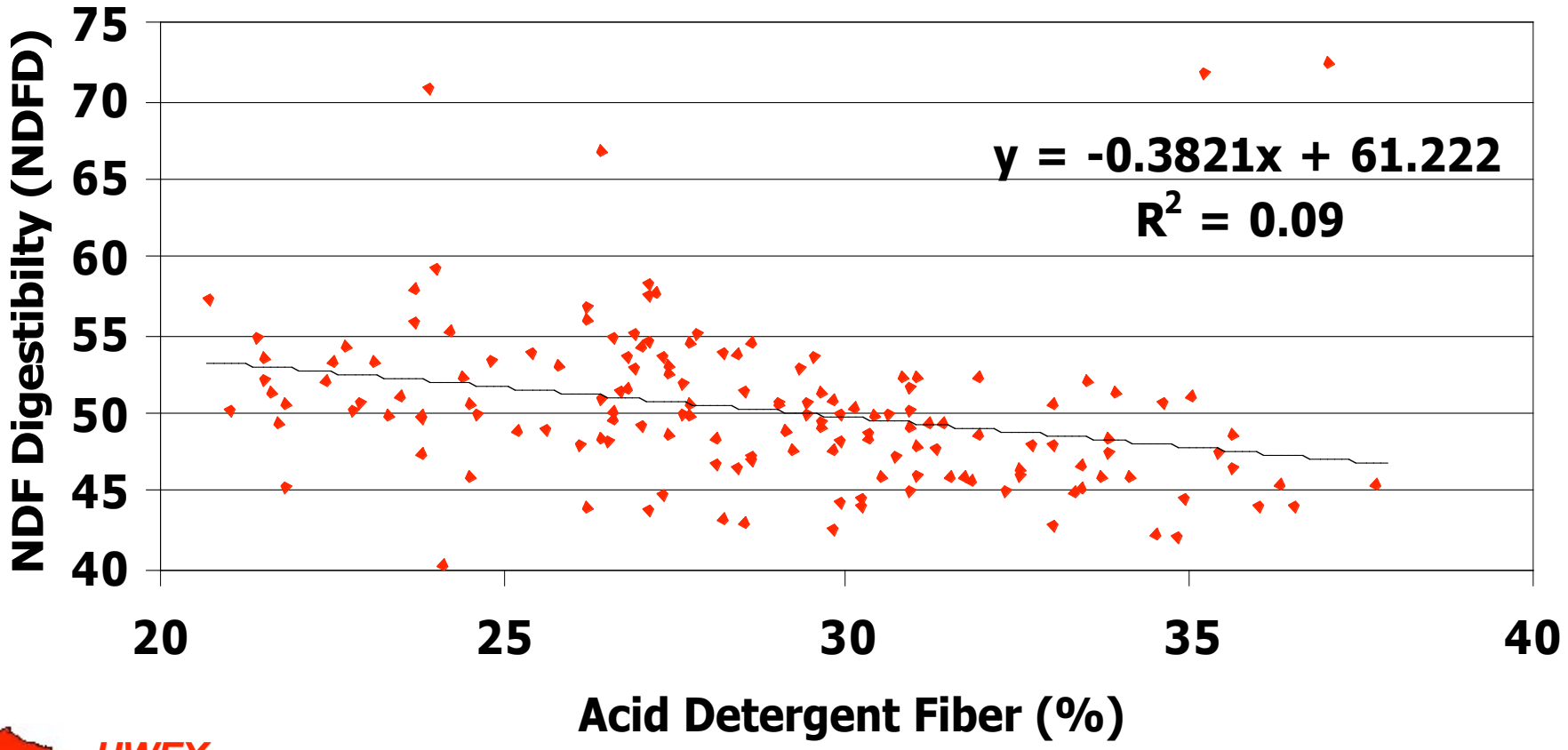
Comparison of ADF to NDF digestibility of 2003 World Forage Superbowl Samples



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Relative Feed Value =

$$\frac{\text{(Intake Potential * Digestible DM)}}{\text{Constant}}$$

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Relative Feed Value (Current)

Intake Potential = 120/NDF

Digestible DM = 88.9 - (0.779*ADF)

Constant = 1.29

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Relative Feed Value (Current)

Intake Potential = 120/NDF

Digestible DM = 88.9 - (0.779*ADF)

Constant = 1.29

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Relative Forage Quality (RFQ) =

$$\frac{(\text{dIntake Potential} * \text{dTDN})}{\text{Constant}}$$

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Relative Forage Quality

Intake potential for legumes

= base intake plus adjustment for dNDF

= base intake + ((dNDF-45) *.374)

=(120/NDF) + (NDFD-45)*0.374*1350/100

From Oba and Allen, 1999, J Dairy Sci

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Relative Forage Quality

Intake potential for grasses

$$= -2.318 + 0.442*CP - 0.0100*CP^2 - 0.0638*TDN + 0.000922*TDN^2 + 0.180*ADF - 0.00196*ADF^2 - 0.00529*CP*ADF$$

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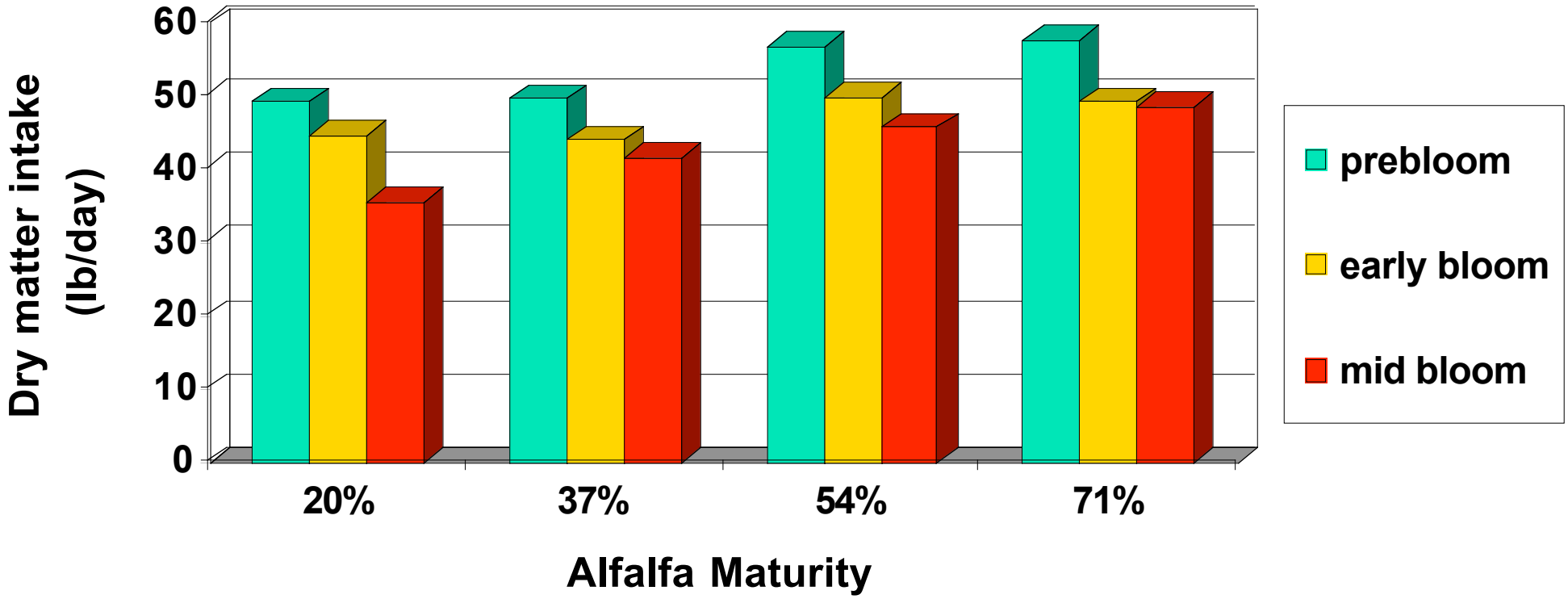
Effect of forage quality on dry matter intake



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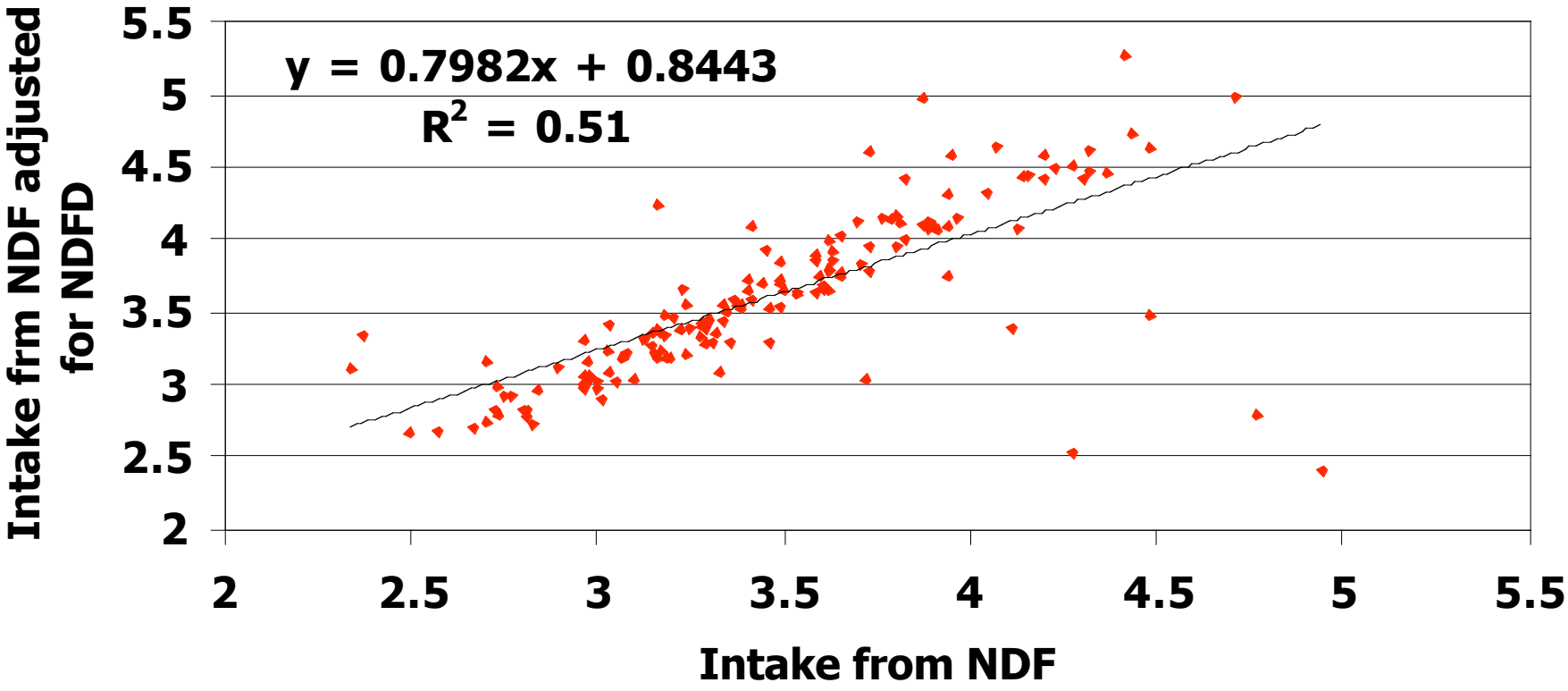
Intake from NDF with and without NDFD adjustment



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Relative Forage Quality

Total Digestible Nutrients (dTDN) for legumes

= dNFC + dCP + dFA*2.25 + dNDF - 7

= (NFC*.98) + (CP*.93) + (FA*.97*2.25) +

(NDF * NDFD) - 7

From NRC, 2001

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Relative Forage Quality

Total Digestible Nutrients (dTDN) for grasses

$$= dNFC + dCP + dFA*2.25 + dNDF - 10$$

$$= (NFC*.98) + (CP*.87) + (FA*.97*2.25) + (NDFn*NDFDp/100) - 10$$

Where NDFDp = 22.7 + .664*NDFD

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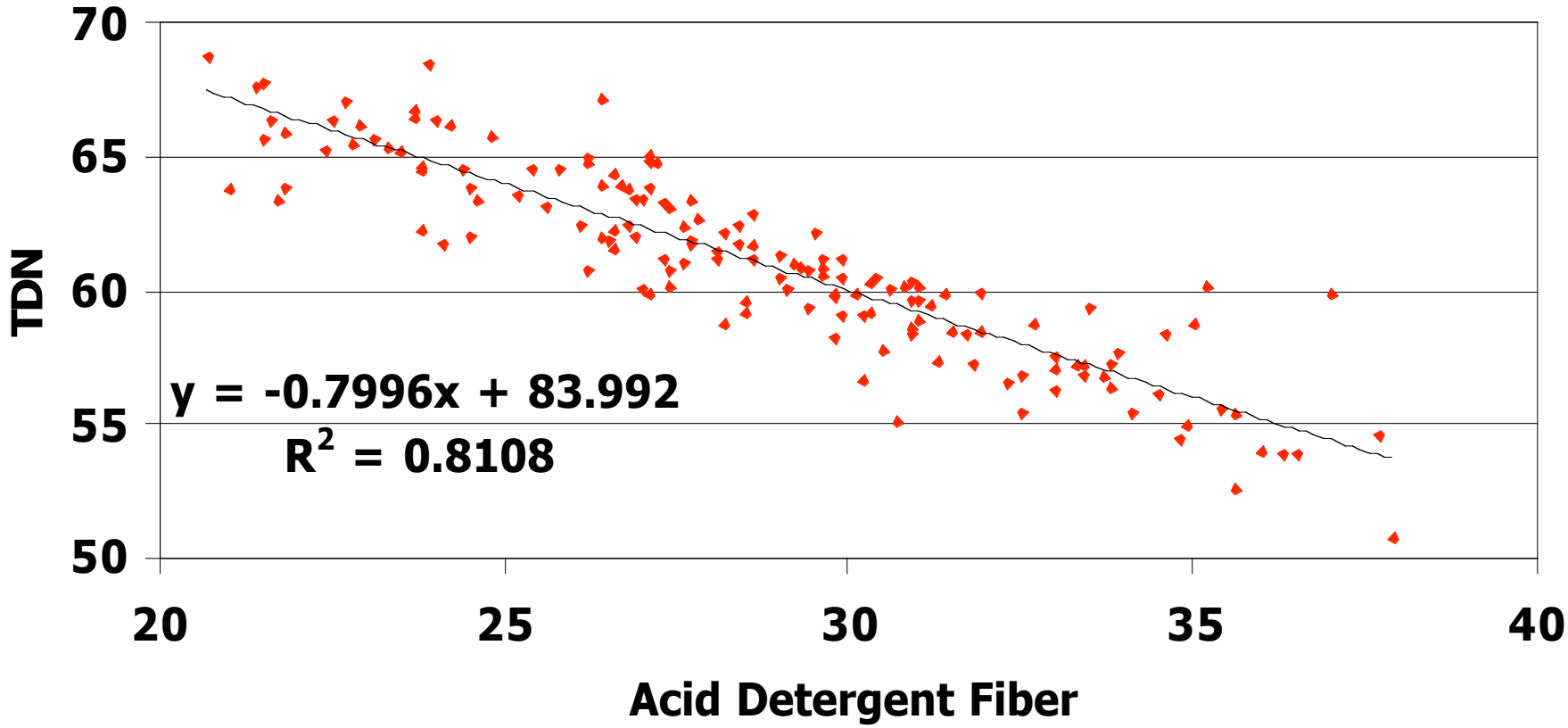
Comparison of ADF to Summative TDN, 2003 Worlds Forage Superbowl



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Relative Forage Quality (RFQ)

$$RFQ = \frac{dIntake\ potential * dTDN}{1.23}$$

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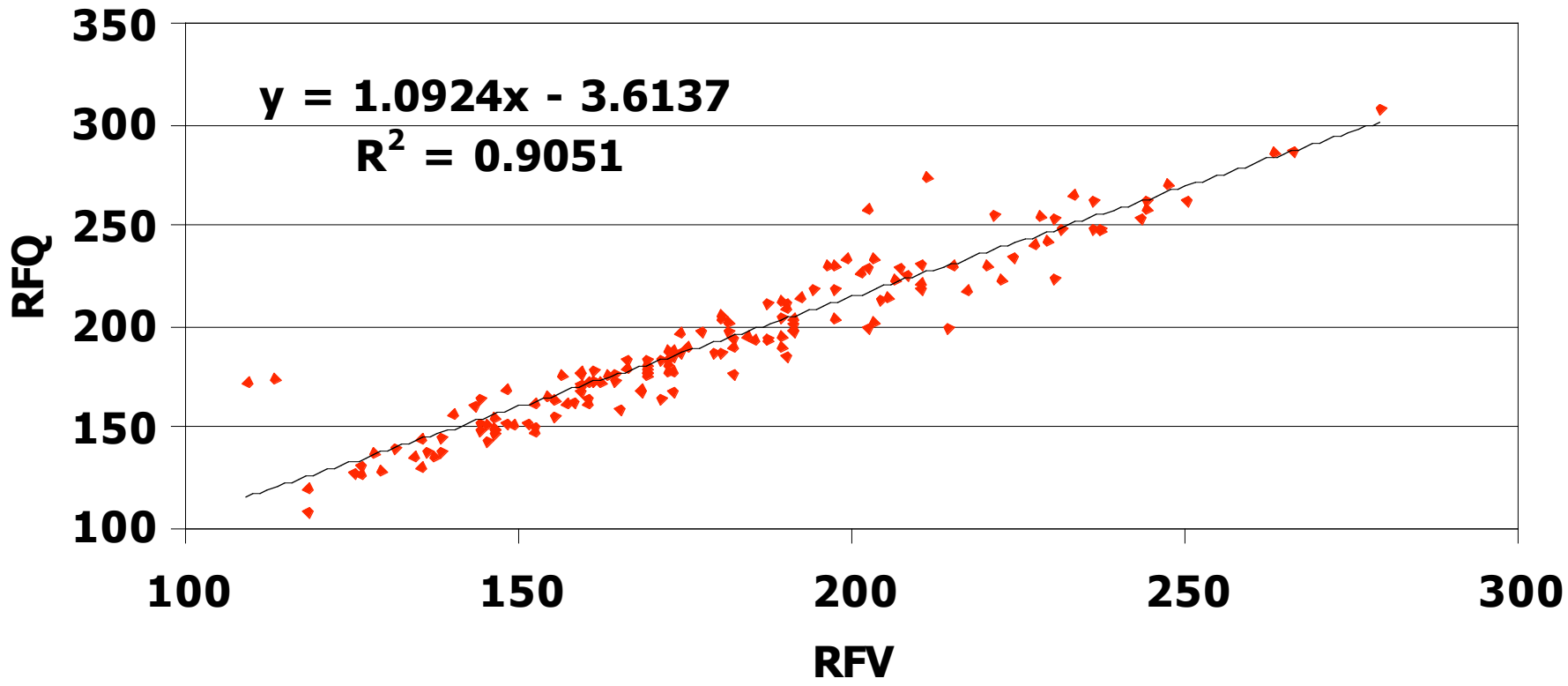
Comparison of RFV to RFQ, 2003 World Forage Superbowl Samples



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Summary

- The r^2 for ADF and in vitro digestibility of the alfalfa samples was 0.56 – slightly less most developed energy equations
- There was little correlation of the ADF content and NDFD. Alfalfa ranged from 40 to 70% NDFD.
- The above resulted in a little relationship between ADF and TDN as calculated from summative equation.

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Comparison of RFQ to RFV

- Was highly correlated (r^2 = 0.9)
- Had similar mean (RFQ=193, RFV=180)
- Had similar response (slope of line was 1.09)
- However, 22% of samples varied by over 20 points and individual samples varied by up to 60 points either way.

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Value of high quality hay

- Increased energy content
- Increased intake
- Use above 150 RFQ to mix with low quality
  - Values low quality forage that may be on hand
  - May be difficult to mix two hays in some operations
- Use above 150 RFQ to mix with corn silage
  - Value to protein because corn silage is lower in protein
  - Value to low NDF because corn silage is higher in fiber

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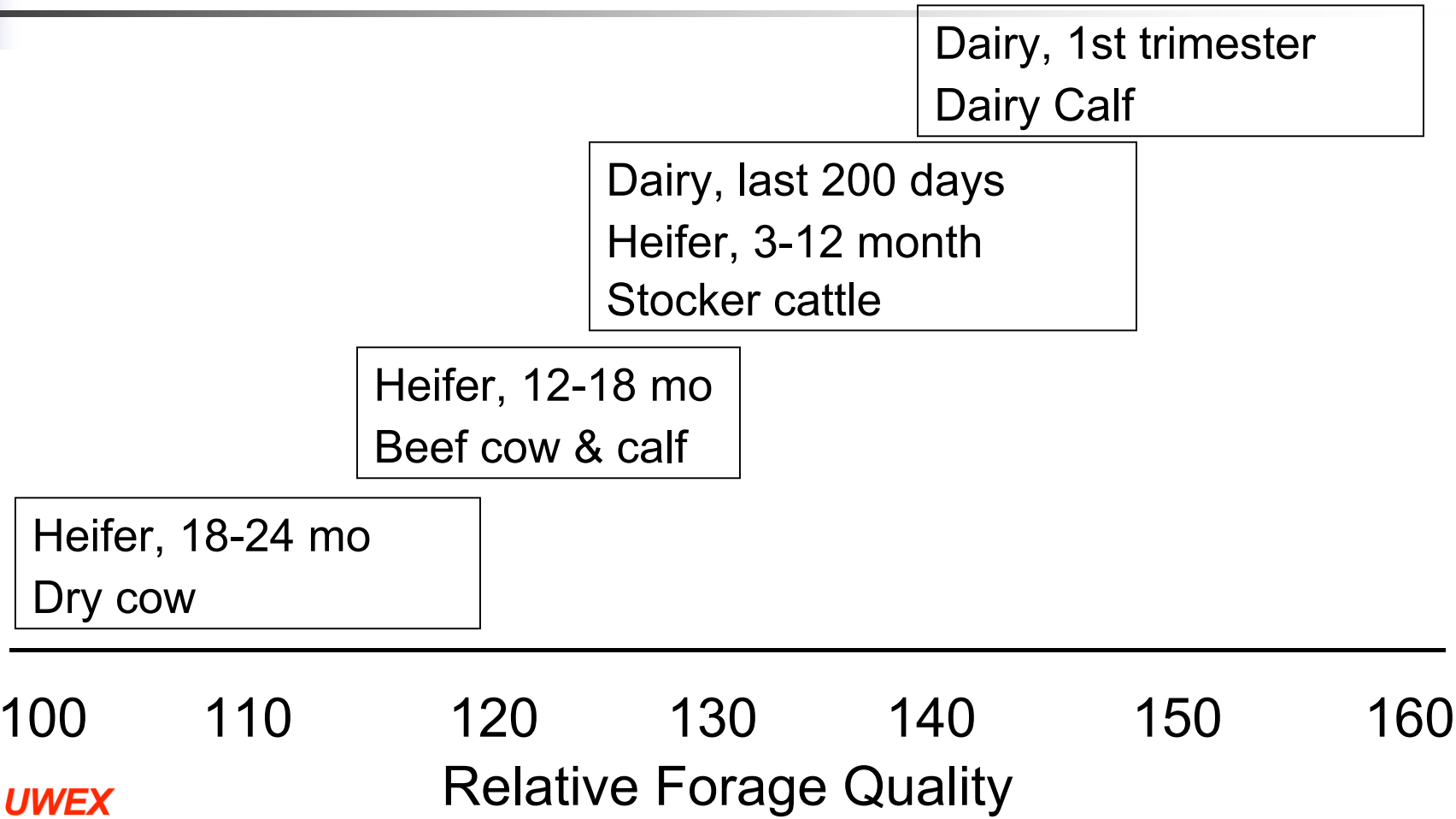
Forage quality needs of cattle



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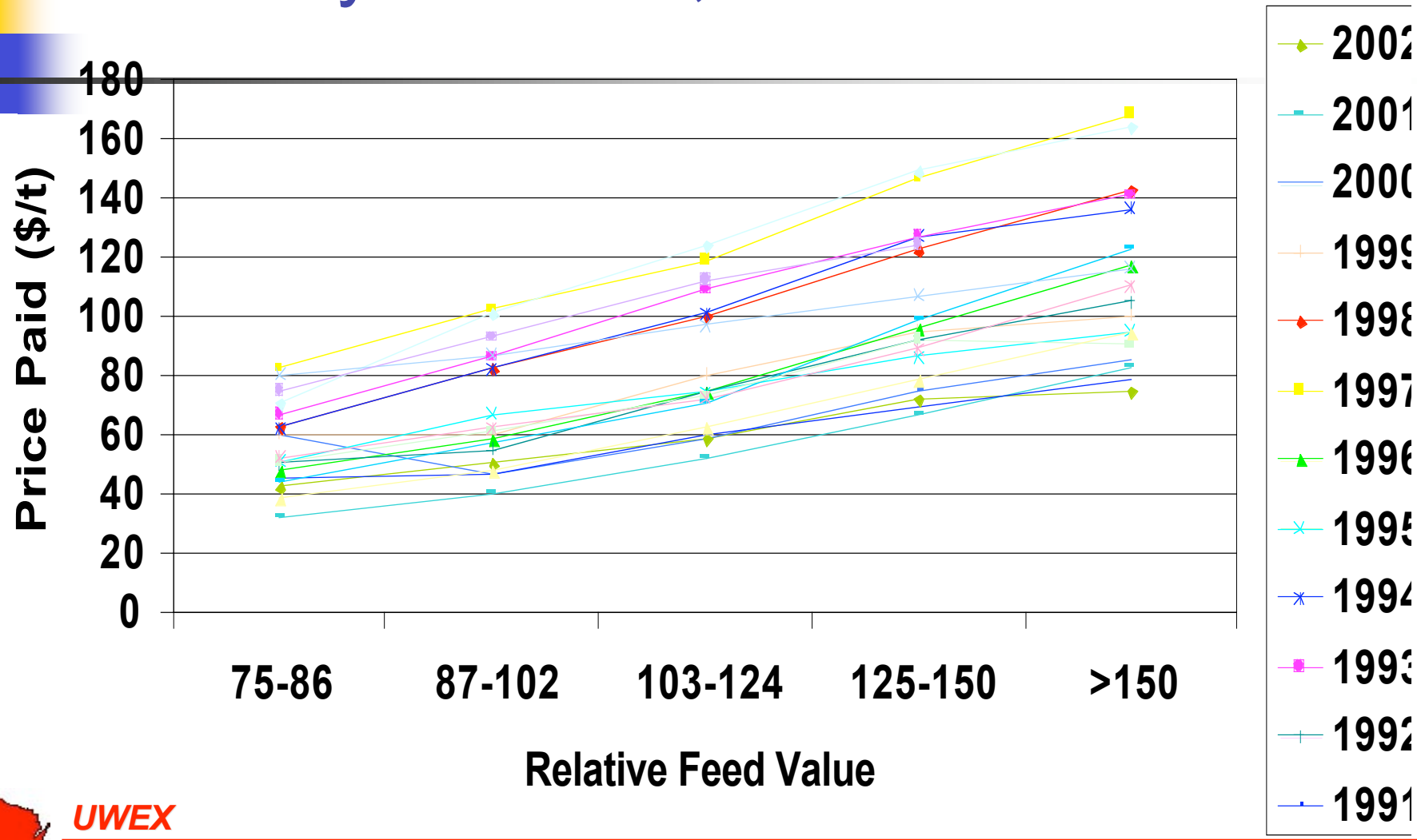
Prices paid at Wisconsin Quality Tested Hay Auctions, 1987 to 2002



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- The base price of hay varies with supply
- The premium for quality is fairly constant

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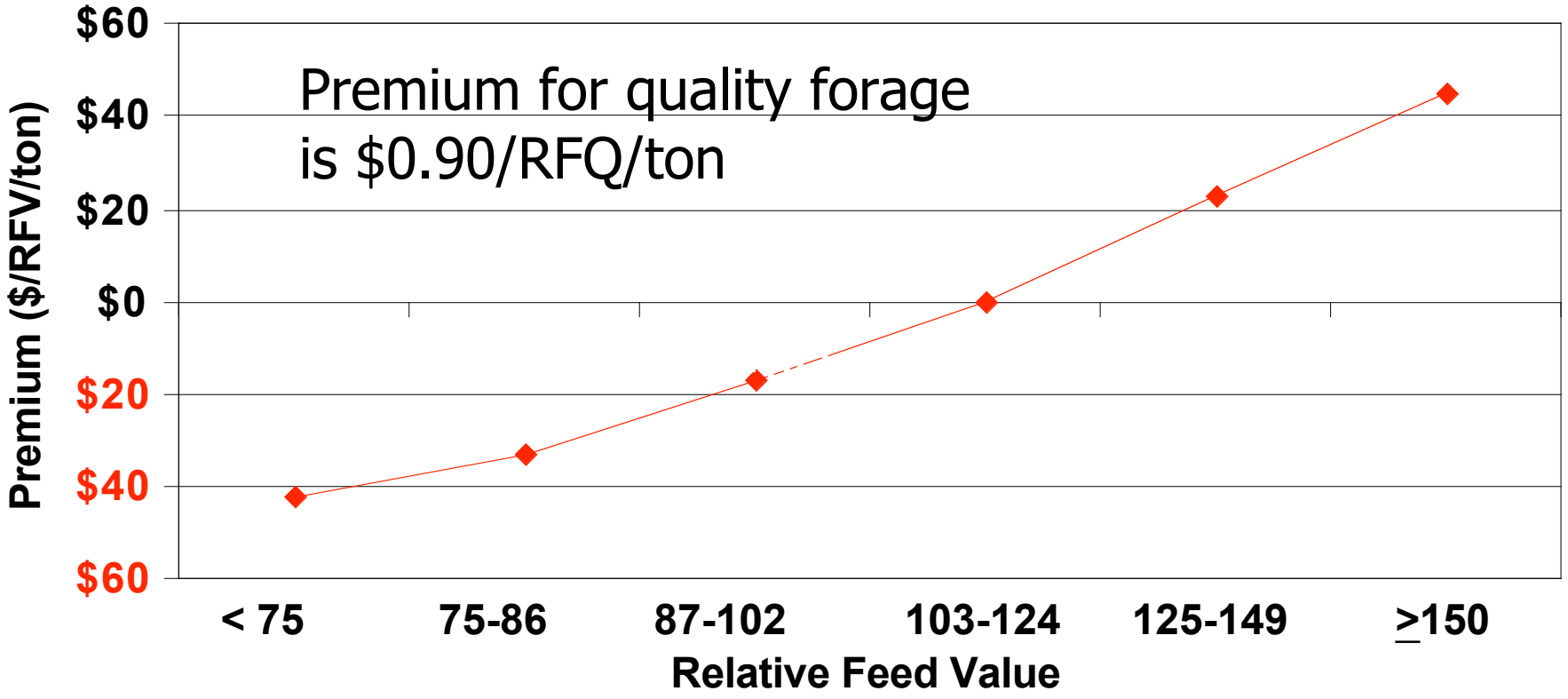
Premiums paid at Wisconsin Quality Tested Hay Auctions, 1984 to 2001



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Use of Relative Forage Quality (RFQ)

- Indexing hay to match with animal needs
- Buying/selling
- Comparing forage varieties

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Further Information

www.uwex.edu/ces/forage

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